

RADIOACTIVE DATING

Resource Site: <http://phet.colorado.edu/en/simulation/radioactive-dating-game>

Materials: 1 green, blue, OR purple colored pencil **AND** 1 red, orange, OR yellow colored pencil

Part 1: How do C-14 and U-238 change/break down over time?

1. Click on the tab for Decay Rates. Check Carbon-14
2. Click on the bucket and add some nuclei to the simulation, observe what happens
3. What do the red dots represent? _____
4. What do the blue dots represent? _____
5. Use the stop and play buttons to control how fast the decay occurs.
6. Explain what the pie graph looks like at one half-life. _____

7. Explain what the pie graph looks like at 2 half lives, then 3 half lives. _____

8. What happens to the Carbon-14 by the end of the simulation? _____

Let's repeat #6-8 for Uranium-238

9. Explain what the pie graph looks like at one half-life. _____

10. Explain what the pie graph looks like at 2 half lives, then 3 half lives. _____

11. What happens to the Carbon-14 by the end of the simulation? _____

Part 2: The Object Dating Game

1. Click on the tab for Dating Game
2. Start measurements with living and dead objects on or just under the surface of the Earth. With these objects use Carbon-14 for measurements.
3. Move the double-sided arrow on the graph to match the % determined from the probe.
4. Guess the age of the object, and record on the data table.
5. Ancient fossils will have no Carbon-14. You must use the ages of rocks (from Uranium-238) in the same rock layer as the fossils to determine the fossil's age.
6. Switch to Uranium-238. Now make guess and measure the ages of the rocks. Record the data in the table.

Object	Isotope Used	% of Isotope Remaining	Prediction: # of Half-lives	Prediction: Absolute Age	Actual Absolute Age (in years)
Animal skull					
Living tree					
House					
Dead tree					
Bone					
Wooden cup					
1 st human skull					
2 nd human skull					
Fish bones					
Fish fossil 1					
Rock 1					
Dinosaur skull					
Rock 2					
Trilobite					
Rock 3					
Rock 4					
Rock 5					

Part III: Synthesis – ANSWER the questions in COMPLETE SENTENCES.

1. Why is Carbon-14 limited when dating objects that are very old?

2. Why is Uranium-238 limited when dating objects that are very young?

3. Circle one: The more the Parent Isotope decays, the older / younger the rock fossil becomes.

4. Were any objects in deeper layers older than those above? Yes or no and explain why.
